1143-170 **Inherited Cardiovascular Diseases: Identification of Silent/Subclinical Forms by Screening Target Groups**

Aris Anastasakis, Artemisia Theopistou, Angelos Rigopoulos, Evangelia Karvouni, Nikos Protonotarios, Dimitris Markou, Elias Sevdalis, Nikos Mamalis, Christodoulos Stefanadis, Pavlos Toutouzas, *Cardiology Dept., University of Athens, Athens, Greece.*

Background: Inherited cardiovascular diseases (ICVD) and sudden death in the young concern not only the patients, but also the members of their families. Besides clinical/ symptomatic forms, there are silent/subclinical forms (SSF) of these diseases.
Methods: We assessed 510 families with ICVD (target group 1: hypertrophic cardiomyopathy - HCM, arrhythmogenic right ventricular cardiomyopathy - ARVC, dilated cardiomyopathy - DCM, Marfan syndrome, long QT syndrome - LQTS) and 25 families with sudden death in a young member with postmortem ICVD diagnosis or unidentified cause (target group 2). Screening involved physical examination, ECG, and echocardiography. Holter, signal average ECG and cardiopulmonary exercise test were also performed when needed. SSF diagnosis was made according to established criteria for relatives of patients with HCM, DCM, or Marfan, and Schwartz's criteria for LQTS.
Results: Table
Conclusion: We identified SSF in 1st degree relatives of 16% of families with ICVD and in 24% of families with sudden death in young members. Screening of target groups conduces substantially to the identification of SSF of ICVD, enabling risk management in subjects who are in potential danger of sudden death.

Target group 1	Patients from different families	Screened 1st degree relatives	SSF identified	Families with SSF
HCM	480	1918	85	65
ARVC	20	182	19	11
DCM	5	30	2	2
Marfan	3	15	2	2
LQTS	2	20	1	1
Total	510	2165	109	81
Target group 2	**Sudden death cases**	**Screened 1st degree relatives**	**SSF identified**	**Families with SSF**
HCM	12	38	9	3
ARVC	3	10	3	2
Normal heart	10	26	1	1
Total	25	74	13	6

MODERATED POSTER SESSION

1144MP Moderated Poster Session...Computer Applications: Patient Management Support and Image Analysis

Monday, March 18, 2002, 3:00 p.m.-5:00 p.m.
Georgia World Congress Center, Hall G

3:00 p.m.

1144MP-121 **Initial Results From a Computerized System to Detect Depression in Cardiac Patients: The Cardiac Depression Management System**

Grant R. Grissom, Richard E. Shaw, Colman Ryan, Colin Movsowitz, Michael Vergare, Gary Ledley, Kevin Hales, Elliott Kulakowski, *San Francisco Heart Institute at Seton Medical Center, Daly City, California, PsyberMetrics, Langhorne, Pennsylvania.*

Background: Depression is an important, prevalent and independent risk factor for patients suffering from cardiovascular disease (CVD). In the majority of cases, it is undetected and/or untreated, and may have significant impact on morbidity, mortality and costs. The computer based Cardiac Depression Management System (CDMS) is designed for detection of depression and clinical decision support.
Methods: CDMS is an automated system in which a patient is guided through questions from a structured survey. The CDMS program manages the patient response data and generates individual and aggregate reports. The questions assess the presence and severity of depressive symptoms, and other psychosocial risk factors for cardiac morbidity and mortality. Patients with sixth grade English literacy can answer all questions in 8-13 minutes. When the patient has completed the questions, the data are added to a database, a depression severity score is computed, and a report printed for the physician. The report indicates: (1) whether the patient screens positive for depression; (2) the severity of depressive symptoms in relation to norms for patients with a similar CVD diagnosis; and (3) specific critical signs that may require immediate action (e.g., potential for suicide).
Results: A sample of 67 cardiac patients (average age = 67 years) were evaluated using the CDMS. A majority were male (61%), 31% had a history of heart attack, 30% had prior cardiac surgery, 37% prior percutaneous coronary intervention, 21% had heart failure, and 54% had either diabetes or chronic lung disease. The Depression Scale (DS) of the CDMS had an internal consistency reliability of 0.88. The DS was highly correlated with the Beck Depression Scale (0.83; $p<0.001$) and the Mental Component Score of the SF-12 (0.87; $p<0.001$). It was unrelated to the SF-12 physical health status scale, demonstrating good validity.
Conclusion: The CDMS is a practical tool for depression screening and clinical decision support, improving patient care and outcome prediction for CVD patients.

3:12 p.m.

1144MP-122 **Reliability of Patient Self-Reporting of INR Self-Test Results to a Central Database Utilizing a Computerized Interactive Voice Response System**

Alan K. Jacobson, Robert D. Scott, Norm H. Peckham, Brian Earp, *Loma Linda VA Medical Center, Loma Linda, California, LifeScan, Milpitas, California.*

Purpose: This study aims to quantify the reliability achieved utilizing computerized IVR (Interactive Voice Response) technology to collect anticoagulation INR results via the telephone from patients performing self-tests at home.
Methods: Patients utilizing LifeScan/Rubicon PST test devices performed their own test at home and recorded the INR result in a manual INR log. The computerized anticoagulation management system developed by InterClin, Inc. with transtelephonic IVR technology was then used to collect these self-test results from patient's interacting with the IVR system. The patients in this study were predominantly chronic anticoagulation patients who were all newly initiated to home testing, the Rubicon test devices and InterClin's IVR system.
Results: 3703 testing events were collected from 106 self-test patients over a 49-week period. 587 of these events required professional assistance due to patient choice to not use the IVR system, telephone access problems, system unavailability or patient INR was out of range requiring professional evaluation before allowing the patient to continue utilizing the IVR system. The remaining 3116 events were handled transtelephonically. The accuracy rate of reported transtelephonic INR values (3116 testing events) vs. manual INR logs was 97%. 56% of patients reported to the IVR system error free. While the reporting error rate of 3% is comparable to a professional keypunch operator there are opportunities to reduce this rate even further by modifying the collection methodology. Of the errors, 37% could be identified and corrective measures taken by a real time data validation routine. With this type of error eliminated, the error rate would have been 2%.
Conclusion: Patient's are able to accurately report self-test results performed remotely utilizing computerized Interactive Voice Response technology providing an efficient, effective mechanism for active surveillance of patients.

3:24 p.m.

1144MP-123 **Physician Acceptance of Point of Care Devices in Cardiovascular Risk Factor Management: Early Experience From a Randomized Trial**

Donald A. Smith, Warren L. Ho, Tom H. Karson, Joseph L. Kannry, Stanley Tuhrim, Grethe S. Birketvedt, Robert A. Phillips, *Mount Sinai School of Medicine, New York, New York.*

Background: While clinical research has targeted blood pressure and LDL-cholesterol as key cardiac risk factors for reducing cardiovascular risk, actual control of these risk factors has proved less than exemplary. Physician use of personal digital assistants has been proposed as a method for providing reminders as well as for collection of on-site patient data for monitoring performance.
Methods: PROMPT (Palm Risk-Outcomes Manager and Patient Tracker) is an NIH-sponsored randomized controlled trial of usual care versus patient reminders through the use of a personal digital assistant (PDA) (total intervention) in an internal medicine training program in New York City. 48 faculty and resident members were assigned to the group given PDAs that contained patient demographics and risk score calculations. This group was encouraged to enter and synchronize patient risk factor data at each patient session in order to generate patient-specific blood pressure and LDL-cholesterol goals, reminders for subsequent follow-up visits, and physician-specific quarterly quality reports. At six months an analysis was made comparing PDA-derived data with actual visit attendance data from the billing system to assess usage of the PDA.
Results: Only 14.5% of total patient visits had data recorded through the PDA. Mean and median utilization rates by individual physicians were 13.8 (S.D. 12.9) and 9.8% respectively. Ten physicians entered no data at all, and the most frequent user recorded 48.7% of visits.
Conclusions: Physicians have not readily accepted using a PDA for CV risk factor management in a patient care setting. In debriefing sessions physicians have offered these reasons: time pressures of using the PDA, lack of incremental value for patient care in the system's current programming and perceived lack of sufficient training in its usage. This preliminary data suggests that physician acceptance of hand-held devices for managing CV risk may be less enthusiastic than initially projected.

3:36 p.m.

1144MP-124 **Does an Educational Intervention Influence Patient Decision Making? Impact of an Interactive Video on Ischemic Heart Disease Patients**

Lawrence Liao, Daniel B. Mark, James G. Jollis, *Duke Clinical Research Institute, Durham, North Carolina.*

Background: Although health care providers have come to encourage patient participation in decision-making, few studies have explored the impact of interventions on this process. This study examined the effects of an educational program on ischemic heart disease (IHD) patients facing revascularization decisions.
Methods: We recruited patients found to have significant coronary disease (≥ 75% stenosis in ≥ 1 coronary arteries) by cardiac catheterization who were eligible for both medical therapy and revascularization. Enrollees watched the Shared Decision-making Program (SDP) and completed pre- and post-viewing surveys. The SDP is an interactive video program that compares medical therapy, angioplasty, and bypass surgery through a physician narrator, patient testimonials, and patient-specific outcome estimates based

upon Duke and Northern New England survival models. Pre-post changes were evaluated with McNemar's test for matched-pair data or the sign test as appropriate.
Results: We enrolled 200 patients (mean age 64.6 years, 56.5% male, 66.5% white, 32% with more than high school education) during the study period. Prior to viewing the SDP, 89% of patients wanted more information about IHD. After viewing the SDP, 39% (26/66) of patients who were initially undecided about a treatment choice were able to select a treatment (p=0.001). Patients reported greater comfort in selecting a treatment (p=0.0002), greater confidence in their chosen treatment (p=0.0002), and less anxiety with the decision process (p=0.0001). In addition, patients reported greater comfort with their knowledge (p=0.0002) and less desire to know more about IHD (p=0.0002). 64% of patients rated the SDP as "very helpful" or "most helpful" in the decision process.
Conclusion: The majority of patients considering coronary revascularization report a need for more information. These data demonstrate that provision of information through an electronic format can address this need and consequently enable patients to take a more active role in their care. With rising time constraints on health care providers, evolving technologies have the potential to supplement physicians in informing major treatment decisions.

3:48 p.m.

1144MP-125 Use of Wireless Local Area Network Systems in Coronary Care Units in Canadian Hospitals

Kok-Swang Tan, Wayne Tymchak, Irwin Hinberg, Richard F. Davies, *University of Ottawa Heart Institute, Ottawa, Canada, Medical Devices Bureau, Health Canada, Ottawa, Canada.*

Computer-based wireless local area network (LAN) systems have the potential to provide real time access to medical information at the bedside. The purpose of this study was to address concerns about the susceptibility of electromedical devices in a coronary care unit (CCU) to electromagnetic interference (EMI) from wireless LAN systems. It was conducted as a collaboration between the Medical Devices Bureau of Health Canada, the University of Ottawa Heart Institute, and University of Alberta Hospitals as part of the Acute Care Extended Surveillance (ACES) project.
The system tested consisted of a PC server linked to a Lucent Wavepoint II fixed emitter located centrally in the CCU just below ceiling level, which communicated with Fujitsu Stylistic LT mobile pen based computers equipped with a Lucent Silver Turbo PCMCIA transceivers. Output from both fixed and mobile transceivers was measured at varying distances. The susceptibility to EMI from both was evaluated for a total of 41 medical devices from 22 different device classes in the CCU of both hospitals. Each device was tested 1) at the usual operating distances and 2) as close as possible to the transceivers. The power output of the Wavepoint II transceiver was less than 100 mW and generated an electrical field strength of 0.1 V/m at one meter, compared to the background electric field strength of <0.5 V/m at each test site. The mobile transceiver produced mild distortion of a diagnostic ultrasound image when held within 0.2 meters of the ultrasound probe. Otherwise, no interference was seen with the functioning of any medical device, even at minimal distances. No tested medical device interfered with RF LAN functioning. All wireless LAN technology should be tested for interference with potentially susceptible devices by the hospital before implementation. These findings suggest that wireless LAN systems may be acceptable for use in most hospitals. This technology may reduce the cost of computerization by eliminating the need for hard wiring and by allowing each mobile workstation to be used for several patients.

4:00 p.m.

1144MP-126 New Uses of the VA's Multimedia Electronic Patient Record in Patient Care, Research, and Education

Ross D. Fletcher, Ruth E. Dayhoff, Amanda C. Graves, Chiao M. Wu, Kevin Crawford, Christopher McManus, Ronald E. Jones, *Department of Veterans Affairs, Washington, Dist. of Columbia, Georgetown University, Washington, Dist. of Columbia.*

Background: The VA multimedia electronic patient record, which is available at over 1500 workstations throughout the Washington VA Medical Center, presents the entire patient record using a GUI based patient chart, with all diagnostic images, including ECGs, and cine loops. The electronic patient record is available remotely and, using the VA's HealtheVet initiative, includes a Web based record a patient can share with third party physicians. System: Using standard off-the-shelf components, the VA has built a distributed network that manages all aspects of the clinical record. Capture stations collect images, which are saved to an optical jukebox and linked to the legacy text based database. A fiber optic backbone distributes information to the data closets. A 10/100-MB link ensures the timely display of large image files such as x-rays and cineangiograms. Cardiology images include echoes, coronary arteriograms, ventriculograms, MUGA, thallium studies, X-rays, and ECG tracings, as well as other multispecialty images. The Cardiology database includes records of over 7,272 Caths; 7,494 Holters; 86,264 ECGs; 22,786 Echocardiograms; 11,213 ETTs; and 1,934 EPs. Results: Non-patient care duties have been significantly streamlined as all notes, orders, reports, and discharge summaries are written directly into the workstation. Delinquent charts have all but been eliminated. Lab values can be compared and plotted. Diagnostic images are available with the chart at any point of care. All patient data is on-line and can be used for reminders, which directly order necessary tests. The database is being mined for research purposes, which has resulted in new treatment protocols being developed and tested for diabetes and hypertension. Patient education is improved since the patient chart can be explained in the doctor's office. Patients participate in their treatment using the Health-eVet web based chart by entering home based measurements and treatments by third party physicians. Conclusions: Clinicians have a tool that provides complete Cardiologic and other patient information, which enhances their productivity and provides better patient care.

4:12 p.m.

1144MP-127 Can Two-Dimensional Echocardiography Accurately Measure Pericardial Effusion Volume?

Anita M. Prakash, Ying Sun, Salvatore A. Chiaramida, Jiang Wu, Richard J. Lucariello, *Our Lady of Mercy Medical Center, Bronx, New York, University of Rhode Island, Kingston, Rhode Island.*

Background: Assessing the severity of pericardial effusion is an important clinical problem and has been based on qualitative or semi-quantitative approaches. A computer algorithm was developed previously for measuring pericardial effusion volume (PEV) with 2D echocardiography. This study was conducted to assess its accuracy for clinical use. Methods: Pericardial and epicardial borders were manually traced on digitized 2D echocardiograms. Each border was used to estimate a volume by use of the proposed 3D-disk method. The conventional area-length method was also used for comparison. The PEV, determined by the difference between the pericardial and cardiac volumes, was compared to the surgically drained volume of pericardial fluid. To assess the intrinsic error of the computational methods, an in-vitro study was conducted by use of a phantom consisting of two latex balloons, one positioned inside the other to mimic the geometry of the pericardium. The balloons were filled with known amounts of water and imaged by use of a 2D echocardiography system. The intra-observer and inter-observer variabilities of the border tracing were evaluated with two clinical cases, each measured 10 times by 10 different observers. Comparison between the estimated PEV (y) and the known PEV (x) was done by linear regression and the Bland-Altman analysis. Results: The clinical study included 20 pericardial window procedures among 19 patients. The drained PEV ranged from 100 cc to 1200 cc. With the 3D-disk method the linear regression resulted in: $y = 0.81 x + 120$ cc; $r = 0.91$, $p < 0.0001$. The limits of 95% confidence from the Bland-Altman analysis were between -243 cc and 278 cc. The percent error, determined by the standard error of the estimate (114 cc) over mean (548 cc), was 20%. By contrast, the phantom study showed a correlation coefficient of 0.98 and a percent error of 6%. The intra-observer variability was 1.5% and inter-observer variability was 3%. The area-length method was less accurate than the 3D-disk method and generally underestimated the PEV. Conclusion: The 3D-disk method and 2D echocardiography provide quantitative assessment of PEV in the clinical situations with accuracy within 20%.

4:24 p.m.

1144MP-128 Automated Analysis of Phase-Contrast Magnetic Resonance Images in the Assessment of Endothelium-Dependent Flow-Mediated Dilation

Ping Tan, *Wake Forest University, School of Medicine, Medical Engineering Dept, Winston-Salem, North Carolina.*

Measurement of flow mediated arterial dilation (FMAD) provides information regarding the status of peripheral arterial endothelial function. Although phase-contrast magnetic resonance imaging (PC-MRI) can be used to measure FMAD, the manual analysis of 1 study (tracing regions of interest and processing data on 100 images) can require 6 or more hours. To enhance the clinical utility of PC-MRI assessment of FMAD, we hypothesized that an automated technique (Multi-Stage Intensity Thresholding or MSIT) for determining femoral arterial area and flow before and after cuff inflation over the thigh could be used to evaluate FMAD in a rapid, accurate, and reproducible manner. In both normal subjects (n=6) and in NYHA class III CHF patients (n=6), we measured the femoral artery cross-sectional area at 30 second intervals before, during and after an ischemic stimulus (5 minutes suprasystolic thigh cuff inflation) using PC-MRI. Image parameters included a 7 mm slice thickness, a 13 cm field of view (FOV), a 256x256 matrix, 40o flip angle, an 18 ms repetition time (TR), a 6.7 msec echo time (TE), a 150 cm/sec velocity encoding ration, and the incorporation of k-space segmentation so as to yield 7 or more frames (temporal resolution of 90 to 105 ms) per cardiac cycle. Compared with manual analysis, automated analysis detected a similar percentage change in FMAD between young healthy individuals (15.5% vs 16.7%) and patients with congestive heart failure (3.2% vs 3.0%). The correlation between percentage of FMAD traced manually and that analyzed automatically was good (r=0.89). Automated analysis time for 100 images averaged 10 minutes vs 6 hours for manual analysis. In conclusion, rapid, accurate assessments of femoral artery FMAD can be obtained using multi-stage intensity thresholding. This methodology allows for the rapid clinical assessment of peripheral arterial endothelial function in patients with cardiovascular disease.

4:36 p.m.

1144MP-129 Automatic Detection of Left Ventricular Contours From Contrast Echocardiography: Comparison With Cardiac Cine Magnetic Resonance

Maria-Aurora Morales, Olaf Rodriguez, Vincenzo Positano, Martha Morelos, Annamaria Sironi, Mirko Passera, Massimo Lombardi, Daniele Rovai, *CNR Clinical Physiology Institute, Pisa, Italy.*

Contrast agents are able to improve endocardial border delineation in echocardiography; however, manual outline of ventricular contours to derive LV volumes and ejection fraction remains subjective and time consuming. The aim of this study was to evaluate whether an automatic contour detection method of contrast echo images may provide reliable estimates of LV volumes as compared to cine Magnetic Resonance Imaging (MRI). In 11 patients with different degrees of ventricular dysfunction, LV volumes were measured by cine MRI and by transthoracic, second harmonic echocardiography after the administration of the contrast agent Levovist (Schering AG, 400 mg/ml I.V. in 2 minutes). Contrast echo images were analyzed bot manually (tracing the contours of LV cavity) and automatically. To increase signal to noise and contrast to noise ratio, the images